

FORM PTO-1390 (Modified) (REV 11-98)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER 112740-178
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR) <b>09/786062</b>
INTERNATIONAL APPLICATION NO. PCT/DE99/02442	INTERNATIONAL FILING DATE 4 August 1999	PRIORITY DATE CLAIMED 31 August 1998	
TITLE OF INVENTION <b>WDM RING NETWORK AND METHOD</b>			
APPLICANT(S) FOR DO/EO/US <b>Horst Mueller</b>			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371</li> <li>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).</li> <li>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</li> <li>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371 (c) (2)) <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</li> </ol> </li> <li>6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</li> <li>7. <input type="checkbox"/> A copy of the International Search Report (PCT/ISA/210).</li> <li>8. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3)) <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input type="checkbox"/> have been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</li> <li>d. <input checked="" type="checkbox"/> have not been made and will not be made.</li> </ol> </li> <li>9. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</li> <li>10. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).</li> <li>11. <input checked="" type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409).</li> <li>12. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).</li> </ol> <p>Items 13 to 20 below concern document(s) or information included:</p> <ol style="list-style-type: none"> <li>13. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</li> <li>14. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</li> <li>15. <input checked="" type="checkbox"/> A <b>FIRST</b> preliminary amendment.</li> <li>16. <input type="checkbox"/> A <b>SECOND</b> or <b>SUBSEQUENT</b> preliminary amendment.</li> <li>17. <input type="checkbox"/> A substitute specification.</li> <li>18. <input type="checkbox"/> A change of power of attorney and/or address letter.</li> <li>19. <input checked="" type="checkbox"/> Certificate of Mailing by Express Mail</li> <li>20. <input checked="" type="checkbox"/> Other items or information:</li> </ol> <p><b>Submission of Drawings - Figures 1-6 on five sheets</b></p>			

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.53) <div style="font-size: 24pt; font-weight: bold; margin-top: 5px;">09/786062</div>		INTERNATIONAL APPLICATION NO. <div style="font-weight: bold; margin-top: 5px;">PCT/DE99/02442</div>		ATTORNEY'S DOCKET NUMBER <div style="font-weight: bold; margin-top: 5px;">112740-178</div>	
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21. The following fees are submitted: <b>BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5)) :</b> <div style="margin-top: 5px;"> <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... \$1,000.00  <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... \$860.00  <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$710.00  <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... \$690.00  <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) ..... \$100.00         </div> <div style="text-align: right; margin-top: 5px;"> <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b> </div>				<b>CALCULATIONS PTO USE ONLY</b>																																																																								
<div style="margin-top: 10px;">           Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)).  <input type="checkbox"/> 20    <input type="checkbox"/> 30         </div> <table border="1" style="width:100%; border-collapse: collapse; margin-top: 5px;"> <tr> <th style="width:15%;">CLAIMS</th> <th style="width:20%;">NUMBER FILED</th> <th style="width:20%;">NUMBER EXTRA</th> <th style="width:10%;">RATE</th> <th style="width:15%;"></th> <th style="width:20%;"></th> </tr> <tr> <td>Total claims</td> <td>6 - 20 =</td> <td>0</td> <td>x</td> <td></td> <td>\$0.00</td> </tr> <tr> <td>Independent claims</td> <td>2 - 3 =</td> <td>0</td> <td>x</td> <td></td> <td>\$0.00</td> </tr> <tr> <td colspan="5">Multiple Dependent Claims (check if applicable) .</td> <td><input type="checkbox"/> \$0.00</td> </tr> <tr> <td colspan="5" style="text-align: right;"><b>TOTAL OF ABOVE CALCULATIONS</b></td> <td>= \$860.00</td> </tr> <tr> <td colspan="5">Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable) .</td> <td><input type="checkbox"/> \$0.00</td> </tr> <tr> <td colspan="5" style="text-align: right;"><b>SUBTOTAL</b></td> <td>= \$860.00</td> </tr> <tr> <td colspan="5">Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)).</td> <td><input type="checkbox"/> 20    <input type="checkbox"/> 30 + \$0.00</td> </tr> <tr> <td colspan="5" style="text-align: right;"><b>TOTAL NATIONAL FEE</b></td> <td>= \$860.00</td> </tr> <tr> <td colspan="5">Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).</td> <td><input type="checkbox"/> \$0.00</td> </tr> <tr> <td colspan="5" style="text-align: right;"><b>TOTAL FEES ENCLOSED</b></td> <td>= \$860.00</td> </tr> <tr> <td colspan="5" rowspan="2"></td> <td>Amount to be: refunded \$</td> </tr> <tr> <td>charged \$</td> </tr> </table>				CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE			Total claims	6 - 20 =	0	x		\$0.00	Independent claims	2 - 3 =	0	x		\$0.00	Multiple Dependent Claims (check if applicable) .					<input type="checkbox"/> \$0.00	<b>TOTAL OF ABOVE CALCULATIONS</b>					= \$860.00	Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable) .					<input type="checkbox"/> \$0.00	<b>SUBTOTAL</b>					= \$860.00	Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)).					<input type="checkbox"/> 20 <input type="checkbox"/> 30 + \$0.00	<b>TOTAL NATIONAL FEE</b>					= \$860.00	Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).					<input type="checkbox"/> \$0.00	<b>TOTAL FEES ENCLOSED</b>					= \$860.00						Amount to be: refunded \$	charged \$
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<div style="margin-top: 10px;"> <input checked="" type="checkbox"/> A check in the amount of <b>\$860.00</b> to cover the above fees is enclosed.   <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees.            A duplicate copy of this sheet is enclosed.   <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. <b>02-1818</b> A duplicate copy of this sheet is enclosed.         </div>																																																																												

**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

William E. Vaughan Bell, Boyd & Lloyd LLC P.O. Box 1135 Chicago, IL 60690-1135	<div style="text-align: center;">           SIGNATURE       </div> <div style="margin-top: 10px;">         William E. Vaughan          NAME       </div> <div style="margin-top: 10px;">         39,056          REGISTRATION NUMBER       </div> <div style="margin-top: 10px;">         February 28, 2001          DATE       </div>
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**CERTIFICATE OF MAILING BY "EXPRESS MAIL" (37 CFR 1.10)**

Applicant(s): Horst Mueller

Docket No.  
**09/786062**  
112740-178

Serial No.	Filing Date	Examiner	Group Art Unit
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Invention: **WDM RING NETWORK AND METHOD**

I hereby certify that the following correspondence:

Transmittal Letter to the United States Designed/Elected Office in duplicate, International application as filed, English translation, executed declaration, Preliminary Amendment, Submission of drawings Figures 1-6 on five sheets, filing fee \$860.00 (see attached envelope for executed assignment and fee), postcard

*(Identify type of correspondence)*

is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to: The Assistant Commissioner for Patents, Washington, D.C. 20231 on

February 28, 2001*(Date)*Julie Alonzo*(Typed or Printed Name of Person Mailing Correspondence)*Julie Alonzo*(Signature of Person Mailing Correspondence)*EL416275410US*("Express Mail" Mailing Label Number)*

Note: Each paper must have its own certificate of mailing.

BOX PCT

IN THE UNITED STATES ELECTED/DESIGNATED OFFICE  
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE  
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

5

**PRELIMINARY AMENDMENT**

APPLICANT: Horst Mueller DOCKET NO: 112740-178  
SERIAL NO: GROUP ART UNIT:  
EXAMINER:  
INTERNATIONAL APPLICATION NO: PCT/DE99/02442  
INTERNATIONAL FILING DATE: 04 August 1999  
INVENTION: WDM RING NETWORK AND METHOD

10

15 Assistant Commissioner for Patents,  
Washington, D.C. 20231

Sir:

20 Please amend the above-identified International Application before entry  
into the National stage before the U.S. Patent and Trademark Office under 35 U.S.C.  
§371 as follows:

**In The Specification:**

On page 1, cancel lines 1-3 and substitute the following therefor:

**--S P E C I F I C A T I O N**

25

**TITLE****WDM RING NETWORK AND METHOD****BACKGROUND OF THE INVENTION****Field of the Invention**

30 The present invention relates to a WDM ring network, and method, wherein  
the transmission capacity of such ring network, which is used predominantly for one-  
way data transport, can be taken advantage of.

**Description of the Prior Art--.**

09786062, 022301

On page 1, line 6, cancel "such".

On page 1, line 6, cancel "e.g.".

On page 1, line 8, insert --for example,-- after the ",".

On page 1, line 8, cancel "are" and substitute therefor --is--.

5 On page 1, line 9, insert a --,-- after "server".

On page 1, line 10, cancel "this" and substitute therefor --the--.

On page 1, line 16, insert --both-- after "direction".

On page 1, line 16, insert --and from-- after "to".

On page 1, line 17, cancel "and from the subscriber".

10 On page 1, line 21, insert --present-- before "invention".

On page 1, lines 21-22, cancel "based on the object of specifying" and substitute therefor --, therefore, directed to--.

On page 1, line 22, cancel "a" before "method".

15 On page 1, cancel lines 25-26 and substitute the following centered heading therefor:

**--SUMMARY OF THE INVENTION--**

On page 1, before line 27, insert the following paragraphs:

20 --Accordingly, the present invention is directed to a ring network which includes: a central network element for feeding in data and for distributing both working signals and protection signals on different transmission paths and in oppositely directed transmission directions, and wherein, proceeding from the central network element, the ring network is subdivided into a first part and a second part; a plurality of further network elements connected to subscribers for forwarding upstream data from the subscribers and for distributing the working signals to the

25 subscribers; wherein the central network element feeds the working signals into the first and second parts of the ring network; wherein the central network element, in accordance with portions of the working signals fed into the first and second parts of the ring network, feeds the working signals as protection signals into the respective other part of the ring network; and wherein the further network elements

forward the protection signals as far as the respective network element terminating the first and left-hand parts of the ring network, and the protection signals are fed into the respective other terminating network element of the first and second parts of the ring network and are forwarded counter to a transmission direction of the working signals to the central network element.

The present invention is further directed to a method for distributing data within a ring network for feeding in data and for distributing both working signals and protection signals on different transmission paths and in oppositely directed transmission directions and for forwarding data from subscribers and for distributing the working signals to the subscribers connected to network elements, the method including the steps of: subdividing the ring network into a first part and a second part; feeding the working signals into both the first and second parts of the ring network; feeding the working signals as protection signals into a respective other part of the ring network; forwarding the protection signals as far as the respective network element terminating the first and second parts of the ring network; feeding the protection signals into the respective other terminating network element of the first and second parts of the ring network; and forwarding the protection signals counter to a transmission direction of the working signals to the central network element.--

On page 1, line 27, insert --present-- before "invention".

On page 1, line 29, insert a --,-- after "utilized".

On page 1, line 31, insert --present-- before "invention".

On page 2, cancel lines 1-8 and substitute the following therefor:

--Additional features and advantages of the present invention are described in, and will be apparent from, the following Detailed Description of the Preferred Embodiments and the Drawings.

#### **DESCRIPTION OF THE DRAWINGS--.**

On page 2, line 11, cancel the ",", and substitute therefor a --;--.

On page 2, line 13, insert --teachings of the present-- after "the".

On page 2, line 14, cancel the ",", and substitute therefor a --;--.

On page 2, line 16, cancel the “,” and substitute therefor a --;--.

On page 2, line 17, cancel the “,” and substitute therefor a --;--.

On page 2, line 20, cancel the “,” and substitute therefor a --;--.

On page 2, before line 25, insert the following centered heading:

5    --**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**--.

On page 2, line 33, cancel “are” and substitute therefor --is--.

On page 2a, line 1, insert --present-- before “invention”.

On page 3, line 1, cancel “In” and substitute therefor --First of all, in--.

On page 3, line 1, insert --of the present invention-- after “understanding”.

10   On page 3, lines 1-2, cancel “first of”.

On page 3, line 5, cancel “realization according to” and substitute therefor  
--ring network which is known in--.

On page 3, line 10, cancel “are” and substitute therefor --is--.

On page 3, line 11, cancel “by means of” and substitute therefor --via--.

15   On page 3, line 12, cancel “are” and substitute therefor --is--.

On page 3, line 23, cancel “by” and substitute therefor --in--.

On page 3, line 27, insert a --,-- after “suitable”.

On page 3, line 28, insert a --,-- after “particular”.

On page 3, line 29, cancel the “,”.

20   On page 3, line 32, cancel “realise” and substitute therefor --achieve--.

On page 3, line 35, insert a --,-- after “is”.

On page 3, line 35, insert a --,-- after “case”.

On page 4, line 2, insert --present-- before “invention”.

On page 4, line 5, cancel “according to” and substitute therefor --of--.

25   On page 4, line 5, insert --present-- before “invention”.

On page 4, line 9, cancel “can”.

On page 4, line 9, insert --can-- after “also”.

On page 4, lines 14-15, cancel “In the case of the method according” and  
substitute therefor --According--.

- On page 4, line 15, insert --method of the present-- before “invention”.
- On page 4, line 23, cancel “are” and substitute therefor --is--.
- On page 5, line 2, cancel “figure” and substitute therefor --Figure--.
- On page 5, line 6, cancel “also”.
- 5 On page 5, line 8, cancel the “,”.
- On page 5, line 8, insert a --,-- after “formed”.
- On page 5, line 9, insert a --,-- after “example”.
- On page 5, line 13, insert a --,-- after “OSO”.
- On page 5, line 30, cancel “there is”.
- 10 On page 5, line 31, insert --there is-- before “also”.
- On page 6, line 20, cancel “by means of” and substitute therefor --via--.
- On page 6, line 24, cancel the “,”.
- On page 6, line 24, insert a --,-- after “case”.
- On page 6, line 26, cancel “by means of” and substitute therefor --via--.
- 15 On page 6, line 28, insert a --,-- after “out”.
- On page 6, line 28, cancel “and”.
- On page 7, line 16, cancel “figure” and substitute therefor --Figure--.
- On page 7, line 17, cancel “are” and substitute therefor --is--.
- On page 7, line 22, cancel “figure” and substitute therefor --Figure--.
- 20 On page 7, line 29, insert a --,-- after “signal”.
- On page 7, line 31, insert a --,-- after “signal”.
- On page 7, after line 34, insert the following paragraph:  
--Although the present invention has been described with reference to  
specific embodiments, those of skill in the art will recognize that changes may be  
25 made thereto without departing from the spirit and scope of the invention as set forth  
in the hereafter appended claims.--



After page 10, add a new page 11 with the following text:

**--ABSTRACT OF THE DISCLOSURE**

A WDM ring network and method for distributing within such ring network for feeding in data and for distributing both working signals and protection signals on different transmission paths and in oppositely directed transmission directions, and for forwarding data from subscribers and for distributing the working signals to the subscribers.--

**In the Claims:**

On page 8, cancel line 1, and substitute the following left-hand justified heading therefor:

**--I Claim As Our Invention:--**

Please cancel claims 1-6, without prejudice, and substitute the following claims therefor:

7. A ring network, comprising:

a central network element for feeding in data and for distributing both working signals and protection signals on different transmission paths and in oppositely directed transmission directions, and wherein, proceeding from the central network element, the ring network is subdivided into a first part and a second part;

a plurality of further network elements connected to subscribers for forwarding upstream data from the subscribers and for distributing the working signals to the subscribers;

wherein the central network element feeds the working signals into the first and second parts of the ring network;

wherein the central network element, in accordance with portions of the working signals fed into the first and second parts of the ring network, feeds the working signals as protection signals into the respective other part of the ring network; and

wherein the further network elements forward the protection signals as far as the respective network element terminating the first and left-hand parts of the ring

network, and the protection signals are fed into the respective other terminating network element of the first and second parts of the ring network and are forwarded counter to a transmission direction of the working signals to the central network element.

5

8. A ring network as claimed in claim 7, wherein the network elements terminating the first and second parts of the ring network are designed such that the protection signals previously forward at the further network elements are selected and fed into the respective other terminating network element of the first and second parts of the ring network.

10

9. A ring network as claimed in claim 7, further comprising:  
optical splitters for splitting the working signals.

15

10. A ring network as claimed in claim 7, further comprising:  
one of optical filters and multiplexers for joining together different optical signals.

11. A method for distributing data within a ring network for feeding in data and for distributing both working signals and protection signals on different transmission paths and in oppositely directed transmission directions and for forwarding data from subscribers and for distributing the working signals to the subscribers connected to network elements, the method comprising the steps of:

20

subdividing the ring network into a first part and a second part;  
feeding the working signals into both the first and second parts of the ring network;

25

feeding the working signals as protection signals into a respective other part of the ring network;

forwarding the protection signals as far as the respective network element terminating the first and second parts of the ring network;

feeding the protection signals into the respective other terminating network element of the first and second parts of the ring network; and

5 forwarding the protection signals counter to a transmission direction of the working signals to the central network element.

12. A method for distributing data within a ring network as claimed in claim 11, the method further comprising the steps of:

10 selecting, in the terminating network elements, the protection signals forwarded at the further network elements; and

feeding the protection signals into the respective other terminating network element of the first and second parts of the ring.

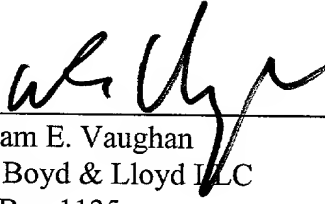
#### **REMARKS**

15 The present amendment makes editorial changes and corrects typographical errors in the specification in order to conform the specification to the requirements of the United States Patent practice. No new matter is added thereby. Original claims 1-6 have been canceled in favor of new claims 7-12. Claims 7-12 have been presented solely because the revisions by bracketing and underlining which would  
20 have been necessary in claims 1-6 in order to present those claims in accordance with preferred United States Patent practice would have been too extensive, and thus would have been too burdensome. The amendment is intended for clarification purposes only and not for substantial reasons related to patentability pursuant to 35 U.S.C. §§101, 102, 103 or 112. Indeed, the cancellation of claims 1-6 does not  
25 constitute an intent on the part of the Applicant to surrender any of the subject matter of claims 1-6.

Early consideration on the merits is respectfully requested.

Respectfully submitted,

5



(Reg. No. 39,056)

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Chicago, Illinois 60690-1135  
(312) 807-4292  
Attorneys for Applicant

10

108220 09098760

10 Rec'd 20 FEB 2001

BOX PCT

IN THE UNITED STATES ELECTED/DESIGNATED OFFICE  
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE  
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

5

APPLICANT: Horst Mueller DOCKET NO: 112740-178  
SERIAL NO: GROUP ART UNIT:  
EXAMINER:

10 INTERNATIONAL APPLICATION NO: PCT/DE99/02442  
INTERNATIONAL FILING DATE: 04 August 1999  
INVENTION: WDM RING NETWORK AND METHOD

15 Assistant Commissioner for Patents,  
Washington, D.C. 20231

**SUBMISSION OF DRAWINGS**

Applicant herewith submits five sheets (Figs. 1-6) of drawings for the  
20 above-referenced PCT application.

Respectfully submitted,



(Reg. No. 39,056)

25 William E. Vaughan  
Bell, Boyd & Lloyd LLC  
P.O. Box 1135  
Chicago, Illinois 60690-1135  
(312) 807-4292  
Attorneys for Applicant

30

FIG 1

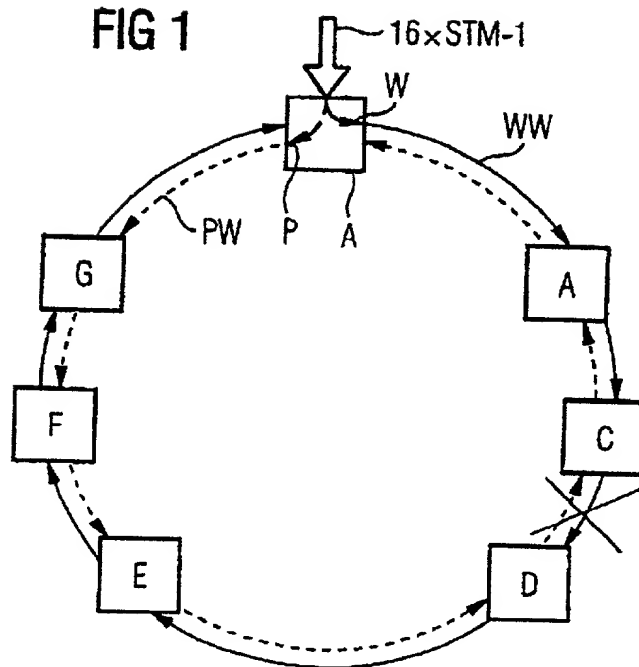
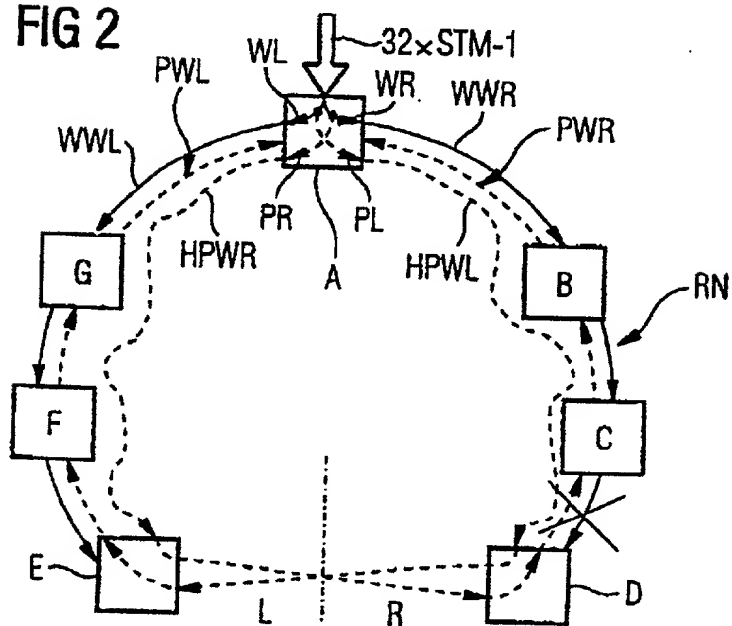
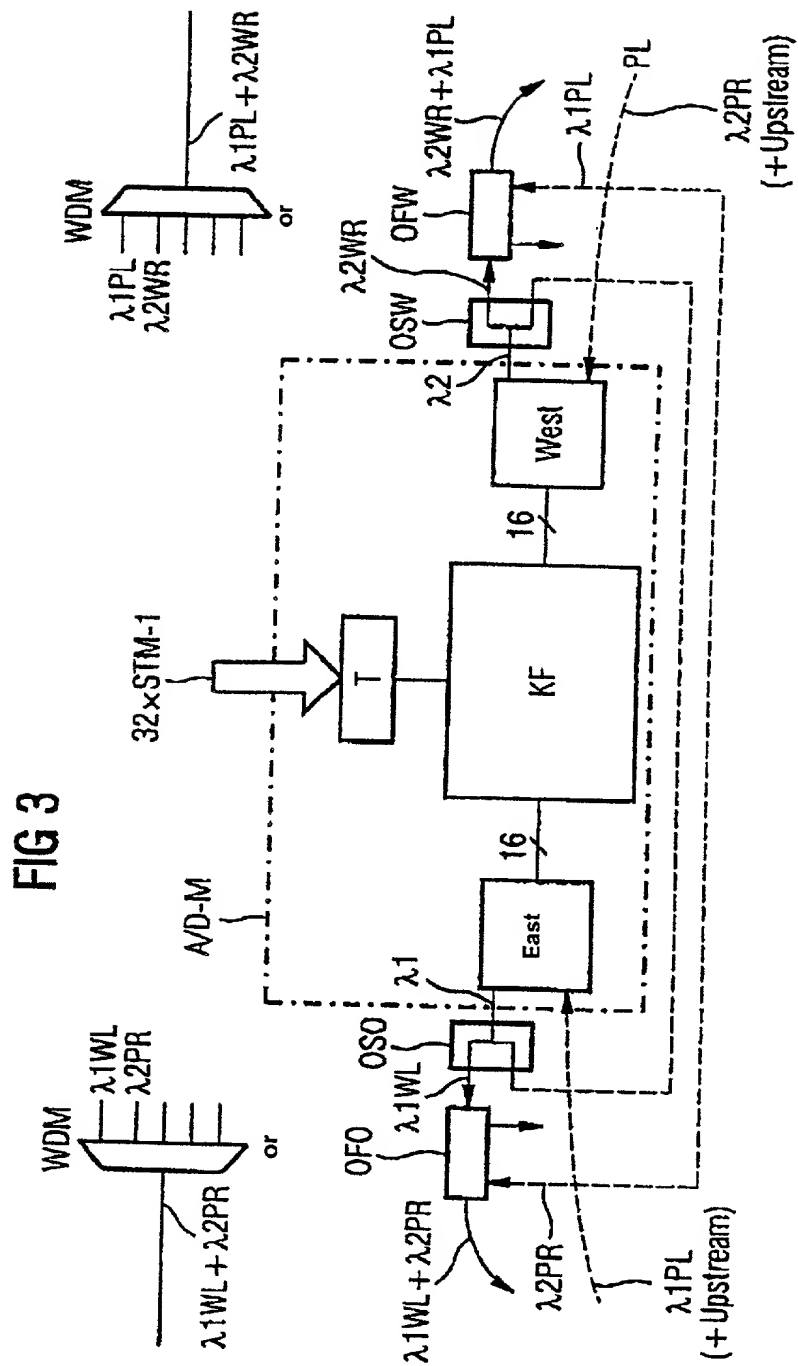
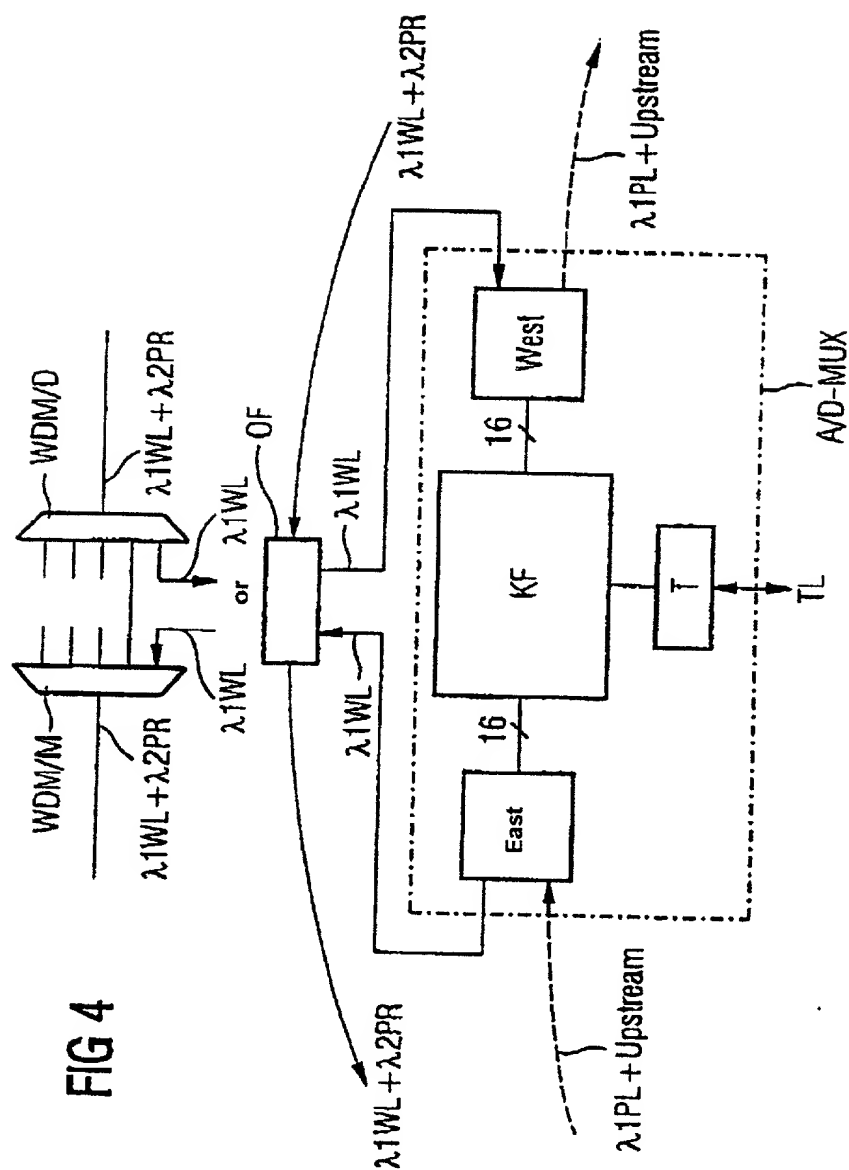


FIG 2









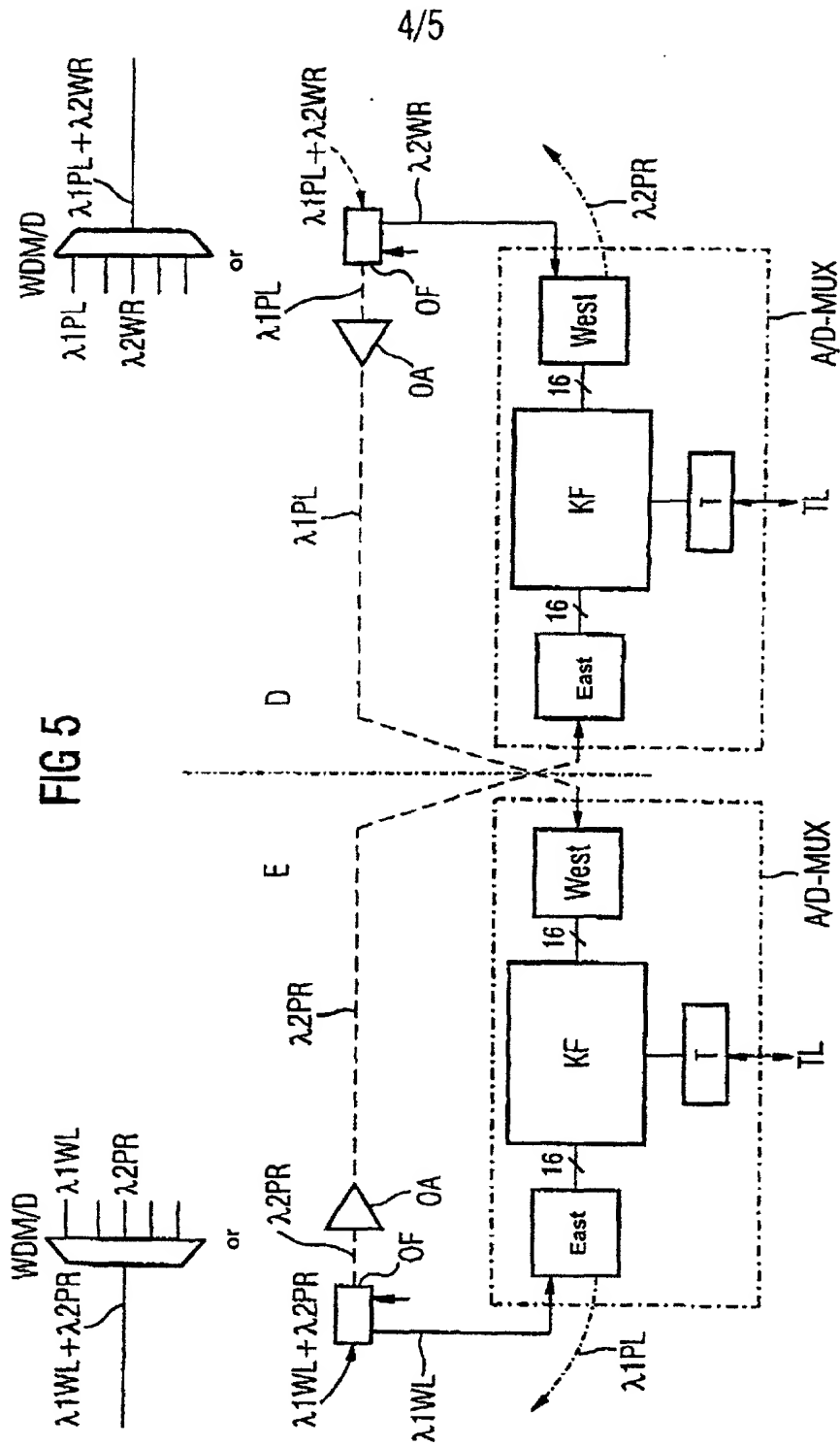


FIG 6

WDM RING NETWORK

## Description

5 In a ring network with predominantly one-way data transport, such as e.g. in the case of data transport within the Internet or in the case of video distribution services, data are transmitted from a central network element, e.g. an internet server toward  
10 the subscriber. In the case of this ring network utilization mentioned at the beginning, only very limited data transport takes place from a subscriber to the central network element.

15 However, conventional transmission methods in the synchronous digital hierarchy provide the same transmission capacity in the transmission direction to the subscriber and from the subscriber. Highly pronounced one-way data transport entails the disadvantage that almost half of the transmission  
20 capacity of the ring network remains unutilized.

The invention is based on the object of specifying a circuit arrangement and a method with which the transmission capacity of a ring network with predominantly one-way data transport can be used.

25 According to the invention, the object set is achieved by means of patent claims 1 and 5.

The invention entails the advantage that the transmission capacity with predominantly one-way data transport on the ring network is utilized with  
30 transmission reliability remaining the same.

The invention entails the advantage that data transport from the subscriber to the central network element of the ring is also possible.

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Further advantageous designs of the circuit arrangement and of the method are specified in the rest of the patent claims.

Further special features of the invention will become apparent from the following more detailed explanations of an exemplary embodiment with reference to drawings.

In the figures:

- 10 Figure 1 shows a construction and the data transport paths of a conventional ring network,  
Figure 2 shows a construction and the data transport paths of a ring network according to the invention,  
15 Figure 3 shows a configuration of a central network element,  
Figure 4 shows a configuration of a network element,  
Figure 5 shows a configuration of network elements which respectively terminate one half of the  
20 ring network, and  
Figure 6 shows a further configuration of network elements which respectively terminate one half of the ring network.

25 In the synchronous digital hierarchy SDH, use is preferably made of ring structures in which individual network elements for coupling out or coupling in data are integrated. The ring structure enables the transmission of data which, if they are  
30 transmitted directly to the subscriber, are designated as working signals. Owing to the high degree of data protection demanded, the data to be transmitted to the subscriber are also transmitted as protection signals on a second transmission path within the ring to the  
35 subscriber. This type of data transmission ensures a high degree of transmission reliability in the event of an interruption of the ring.

The invention's method with associated circuit configuration will be explained in more detail using a ring structure with synchronous transfer mode STM data transmission.

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In order to provide a better understanding, first of all data transport directed one-way will be assumed, in which no data transport takes place from a subscriber to the central network element.

5           Figure 1 illustrates a realization according to the prior art. In this figure, a central network element A and a multiplicity of network elements B to G are arranged in the ring. 16 x STM-1 signals, e.g. from a central internet server, are fed into the central  
10 network element A of the ring, in which the data are transmitted by means of a synchronous transfer mode STM. In the central network element A, the data are fed into the ring both in the clockwise direction as working signals W on a working path WW and in the  
15 counterclockwise direction as protection signals P in a protection path PW. The working path WW is represented by a solid line and the protection path PW is represented by a broken line.

          In the event of an interruption in the ring, e.g. between the network element C and the network  
20 element D, the network elements B and C continue to be reached via the working path. The network elements D to G, by contrast, are supplied with the protection signals P.

25           The protection method used is a subnetwork connection protection SNCP method, also referred to as path protection method. This method is suitable in particular in the case of data traffic directed one-way, since it offers the same transmission capacity in  
30 the ring as a shared ring protection method. In this method, the control of the working and protection signals is simple to realise since there is no need for any changeover protocols for a changeover in the network elements. The changeover in the network  
35 elements is in each case effected at the receiving end on the basis of local information.

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Figure 2 illustrates the data paths within the ring according to the invention. The working path WWR, WWL is represented by a solid line and the protection path PWR, PWL is represented by a broken line. In the case of the method according to the invention, the ring is logically subdivided into two ring halves, proceeding from the network element A. 32 x STM-1 signals are fed into the ring by the central network element A, which can also be referred to as gateway node A. In this case, 16 x STM-1 signals are fed into the ring as working signals WR on the working path WWR in the clockwise direction and 16 x STM-1 signals are fed into the ring as working signals WL on the working path WWL in the counterclockwise direction. In the case of the method according to the invention, the protection signals PR, PL are transmitted on separate paths from the central network node A to the terminating network element pair D, E, between which the first and second parts of the ring adjoin one another. In the figure shown, the logical separating point of the ring subdivided into two ring halves is between the terminating network elements D and E. In the clockwise direction, data fed into the ring are forwarded in the left-hand ring half and, respectively, first part of the ring in the counterclockwise direction as protection signals past the network elements G and F as far as the network element E. Only in the terminating network element E are the protection signals fed into the ring and run in the opposite direction to the working signals in the right-hand ring half and, respectively, into the second part of the ring to the central network node A. The same procedure is effected with the data fed into the left-hand ring half and, respectively, into the first part of the ring. In this case, the protection signals are fed past the network elements B and C and selected only at the terminating network element D and fed into the terminating network element E into the right-hand ring half and run in

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the opposite transmission direction in the left-hand ring half to the working signals transmitted in the left-hand ring half.

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A configuration of the central network node A is represented in figure 3. The core of the central network node A is formed by an add/drop multiplexer A/D-MUX, to which 32 x STM-1 signals are fed. The add/drop multiplexer A/D-MUX is designed with a tributary connection T, a switching matrix KF and also optical STM-16 line interfaces East and West. The line interfaces East and West output optical signals, formed for example by selective lasers with specific wavelengths  $\lambda_1$  and  $\lambda_2$ . There are arranged at the line interfaces East and West, in each case in series, an optical splitter OSO, OSW and an optical filter OFO, OFW. In the optical splitter OSO the optical signal  $\lambda_1$  is split into working signals  $\lambda_{1WL}$  and into protection signals  $\lambda_{1PL}$ . In the optical splitter OSW connected to the line interface West, the optical signal  $\lambda_2$  is split into working signals  $\lambda_{2WR}$  and protection signals  $\lambda_{2PR}$ .

Downstream of the line interface East, in the optical filter OFO, the working signals  $\lambda_{1WL}$  of the line interface East and the protection signals  $\lambda_{2PR}$  formed in the optical splitter OSW at the line interface West are added and form an optical signal  $\lambda_{1WL}$  and  $\lambda_{2PR}$ . An optical signal  $\lambda_{2WR}$  and  $\lambda_{1PL}$  is formed by the optical filter OFW in a corresponding manner in the opposite direction.

The working and protection signals  $\lambda_{1WL}$ ,  $\lambda_{2PR}$  and  $\lambda_{2WR}$ ,  $\lambda_{1PL}$ , respectively, are in each case forwarded to the nearest network elements G, F, E and B, C, D, respectively.

At both optical filters OFO, OFW there is, however, also the possibility of selecting a desired optical signal.

Instead of the optical filters OFO, OFW, it is also possible to use wavelength division multiplexers WDM. Protection signals and upstream signals pass to the line interfaces East and West from the respectively following network elements.

Figure 4 shows a configuration of the network elements B, C, F and G of the ring. An optical filter OF or a wavelength division demultiplexer WDM/D; wavelength division multiplexer WDM/M in the network elements F and G in the left-hand ring half taps off from the optical signal  $\lambda_{1WL}$ ,  $\lambda_{2PR}$  the working signal  $\lambda_{1WL}$  and allows the protection signal  $\lambda_{2PR}$  to pass. Likewise, the protection signal  $\lambda_{1PL}$  in the optical filters OF of the network elements B, C in the right-hand ring half are fed past the network elements B, C in the right-hand ring half.

At the line interface West, the working signal  $\lambda_{1WL}$  is fed to the add/drop multiplexer A/D-MUX, and through the switching matrix KF, signals intended for subscriber TL connected to this network element are coupled out and passed on to the subscriber TL via a tributary connection T.

Portions of the working signal  $\lambda_{1WL}$  that are to be forwarded are coupled via the line interface East once again by means of the optical filter OF into the data stream on the working path WWL of the ring, so that an optical signal  $\lambda_{1WL}$  and  $\lambda_{2PR}$  is once again produced. In the opposite direction, at the line interface East, in this case the protection and upstream signals can be applied to the A/D MUX. In the right-hand half of the ring, by means of the same procedure, a specific signal for a subscriber in the network elements B, C is coupled out and the remainder of the working signal is coupled in again and protection and upstream signals are forwarded.

Figure 5 shows a configuration of the terminating network elements D and E which respectively terminate one half of the ring network. With the aid of an optical filter OF or a wavelength division demultiplexer WDM/D, the working signal  $\lambda_{1WL}$  is coupled out from the terminating network element E and fed to a line interface East of the terminating network element E. The protection signal  $\lambda_{2PR}$  is fed, if appropriate, via an optical amplifier OA to the

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line interface East of the terminating network element  
D. Via the switching

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matrix KF of the terminating network element D and the line interface West of the terminating network element D, the protection signals  $\lambda 2PR$  previously forwarded on to the auxiliary protection path HPWR in the left-hand half of the ring pass into the protection path PWR of the right-hand half R of the ring network RN. The protection signals  $\lambda 1PL$  which were previously forwarded on the auxiliary protection path HPWL in the right-hand half R of the ring network RN pass via the line interface West, the switching matrix KF and via the line interface East into the protection path PWL of the left-hand half L of the ring network.

Figure 6 shows a further configuration of the network elements D and E which respectively terminate one half of the ring network. This configuration differs from that shown in figure 5 by virtue of the fact that data are sent from a subscribers TL connected to these network elements to other network elements or to the central network element A within the left-hand or right-hand half of the ring. In a departure from the illustration from figure 5, the protection signal  $\lambda 2PR$  is fed from the optical filter OF via a tributary connection to the switching matrix KF of the network element E. The protection upstream data transport is likewise fed in the switching matrix KF. Between the line interfaces East of the network element D and the line interface West of the network element E, the aggregate signal formed from protection signal  $\lambda 2PR$  and protection upstream signal and also the aggregate signal formed from the protection signal  $\lambda 1PL$  and protection upstream signal are output. The upstream data stream in the ring correspondingly reduces the capacity of the data fed into the central network element A.

## Patent claims

1. Ring network (RN) having

- a central network element (A) for feeding in data and  
5 for distributing working and protection signals ( $\lambda 1WL$ ,  
 $\lambda 2PR$ ;  $\lambda 2WR$ ,  $\lambda 1PL$ ) on different transmission paths and  
in oppositely directed transmission directions,  
- further network elements (B,...,G) for forwarding  
upstream data from the subscriber (TL) and for  
10 distributing working signals ( $\lambda 1WL$ ,  $\lambda 2WR$ ) to the  
subscribers (TL) connected to the network elements,  
characterized

in that the ring network (RN), proceeding from the  
central network element (A) is subdivided into a first  
15 part (R) and a second part (L),

in that in the central network element (A) feeds  
working signals ( $\lambda 2WR$ ,  $\lambda 1WL$ ) into the first and second  
parts of the ring network (RN),

in that the central network element (A), in accordance  
20 with the portions of the working signals ( $\lambda 2WR$ ,  $\lambda 1WL$ )  
fed into the first and second parts (R,L) of the ring  
network (RN), feeds said signals as protection signals  
( $\lambda 2PR$ ,  $\lambda 1PL$ ) respectively into the other part of the  
ring network,

25 in that the further network elements (B, C; G, F)  
forwards the protection signals ( $\lambda 2PR$ ,  $\lambda 1PL$ ) in each  
case as far as the network element (D, E) terminating  
the first and left-hand parts of the ring network and  
the protection signals ( $\lambda 2PR$ ,  $\lambda 1PL$ ) are fed into the  
30 respective other terminating network element (E, D) of  
the first and second parts (R, L) of the ring network  
(RN) and are forwarded counter to the transmission  
direction of the working signals to the central network  
element (A).

35 2. Circuit arrangement according to claim 1,  
characterized

in that the network elements (D, E) terminating the  
first and second parts of the ring network (RN) are

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designed in such a way that the protection signals ( $\lambda_{2PR}$ ,  $\lambda_{1PL}$ ) previously forwarded at the further network elements are selected and fed into the

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respective other terminating network element (E, D) of the first and second parts of the ring network (RN).

3. Circuit arrangement according to claim 1 or 2, characterized

5 in that optical splitters are provided for splitting the working signals ( $\lambda_{2WR}$ ,  $\lambda_{1WL}$ ).

4. Circuit arrangement according to one of claims 1 to 3, characterized

10 in that optical filters or multiplexers are used for joining together different optical signals.

5. Method for distributing data within a ring network (RN) for feeding in data and for distributing working and protection signals ( $\lambda_{1WL}$ ,  $\lambda_{2PR}$ ;  $\lambda_{2WR}$ ,  $\lambda_{1PL}$ )

15 on different transmission paths and in oppositely directed transmission directions and for forwarding data from the subscriber (TL) and for distributing working signals ( $\lambda_{1WL}$ ,  $\lambda_{2WR}$ ) to the subscribers (TL) connected to the network elements,

20 characterized

in that the ring network (RN) is subdivided into a first part (R) and a second part (L),

in that working signals ( $\lambda_{2WR}$ ,  $\lambda_{1WL}$ ) are fed into both parts of the ring network (RN),

25 in that, in accordance with the portions of the working signals ( $\lambda_{2WR}$ ,  $\lambda_{1WL}$ ) fed into the two parts of the ring network (RN), said signals are respectively fed as protection signals ( $\lambda_{2PR}$ ,  $\lambda_{1PL}$ ) into the other part of the ring network,

30 in that the protection signals ( $\lambda_{2PR}$ ,  $\lambda_{1PL}$ ) forwards in each case as far as the network element (D, E) terminating the first and second parts of the ring network and the protection signals ( $\lambda_{2PR}$ ,  $\lambda_{1PL}$ ) are fed into the respective other terminating network element

35 (E, D) of the first and second parts of the ring network and are forwarded counter to the transmission direction of the working signals to the central network element (A).

6. Method according to claim 5,  
characterized  
in that the protection signals ( $\lambda_{2PR}$ ,  $\lambda_{1PL}$ ) forwarded  
at further network elements (B, C; G, F) are selected  
5 in the terminating network elements (D, E) and are fed  
into the respective other terminating network element  
(E, D) of the first and second parts of the ring.

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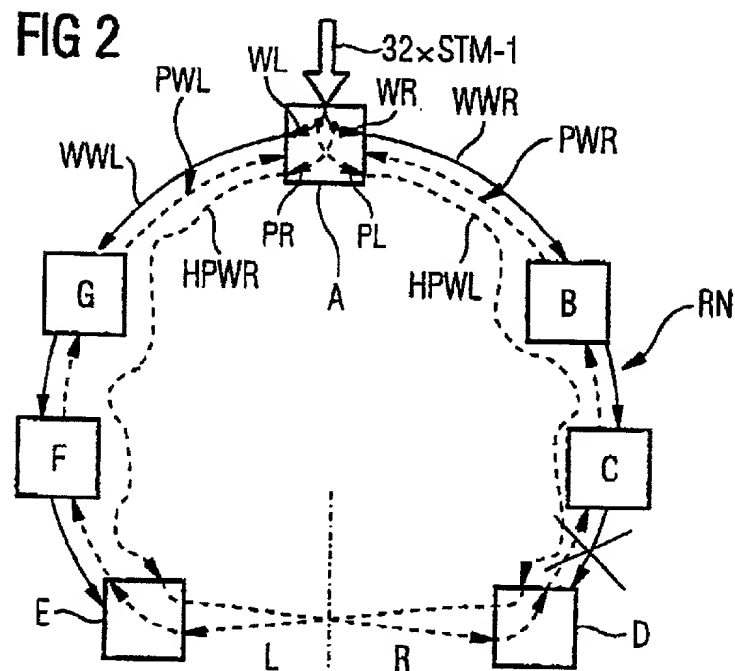
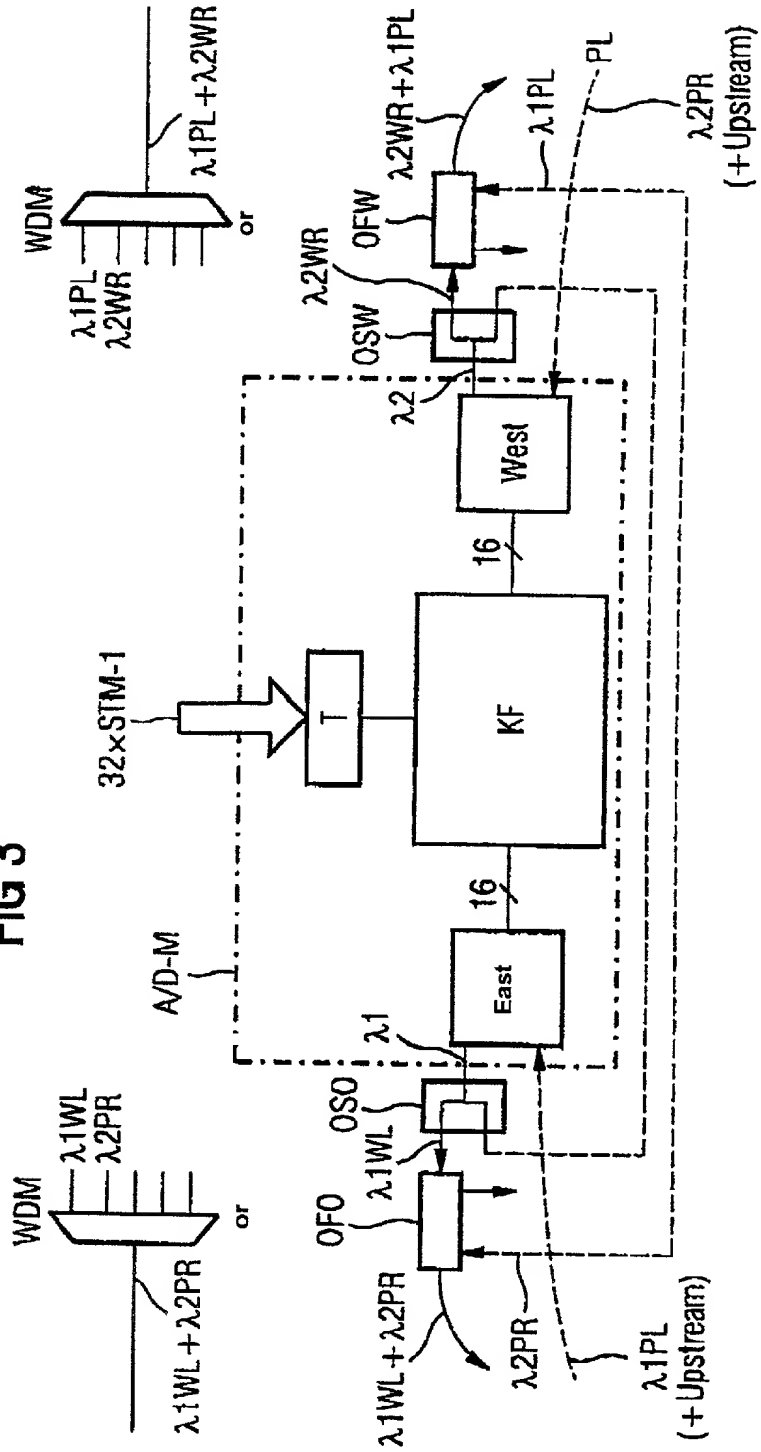
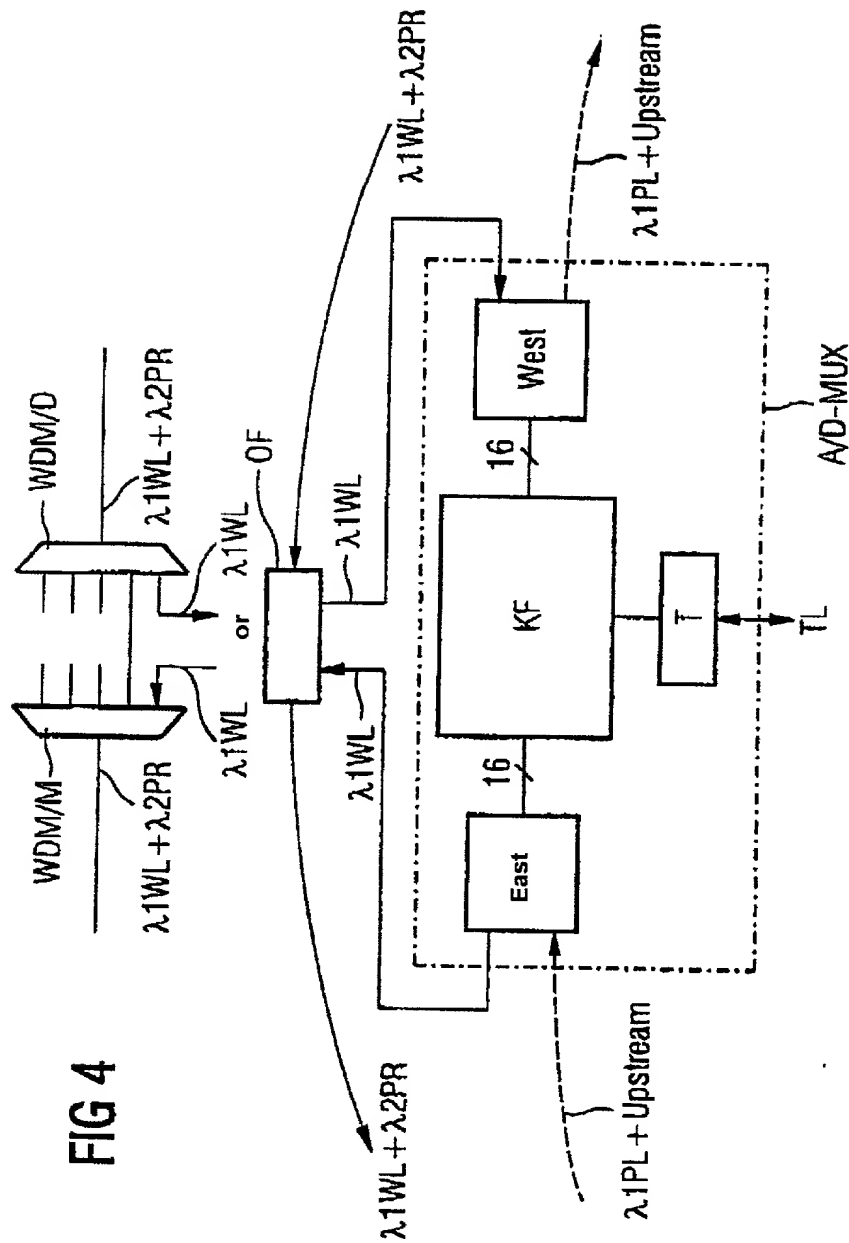
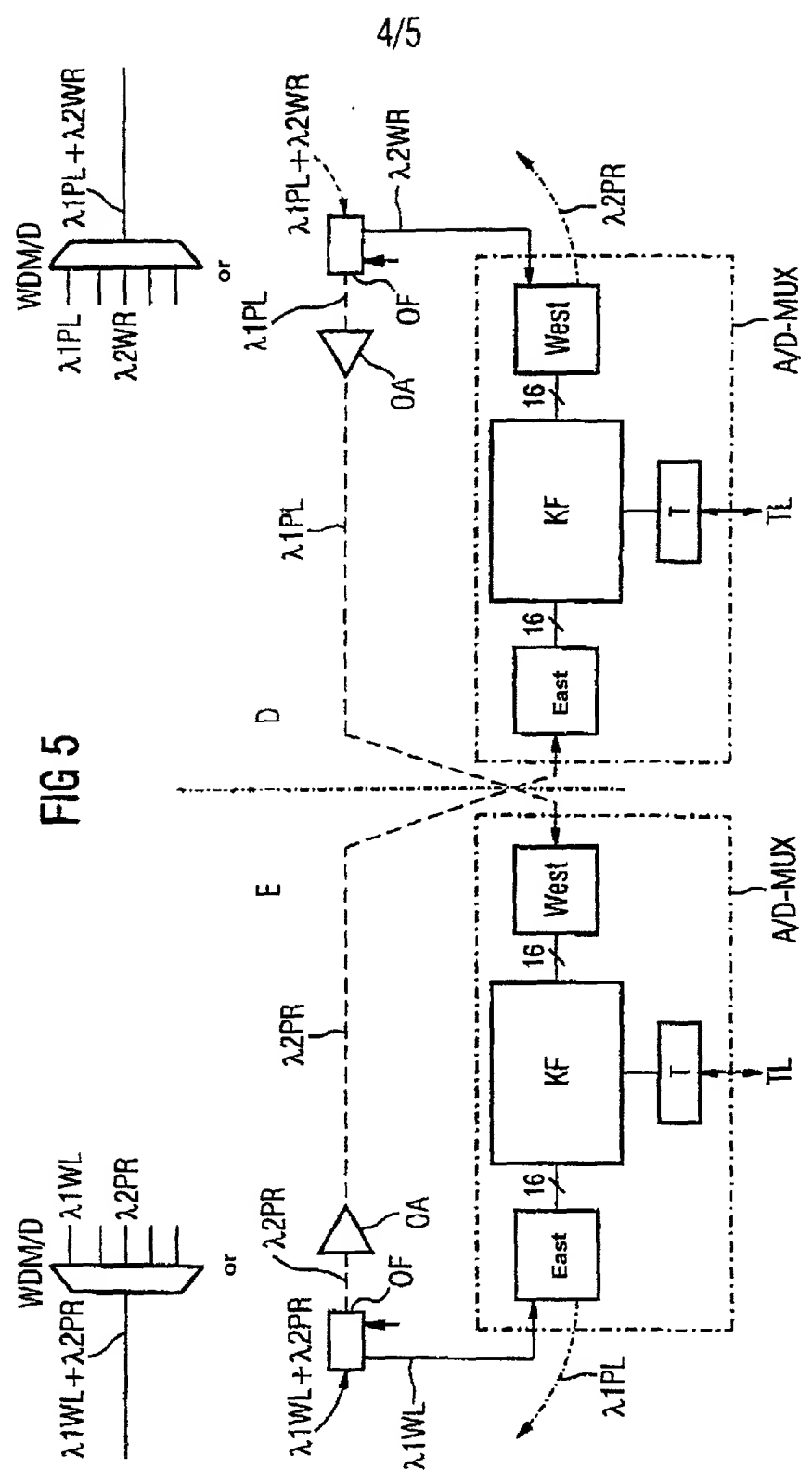


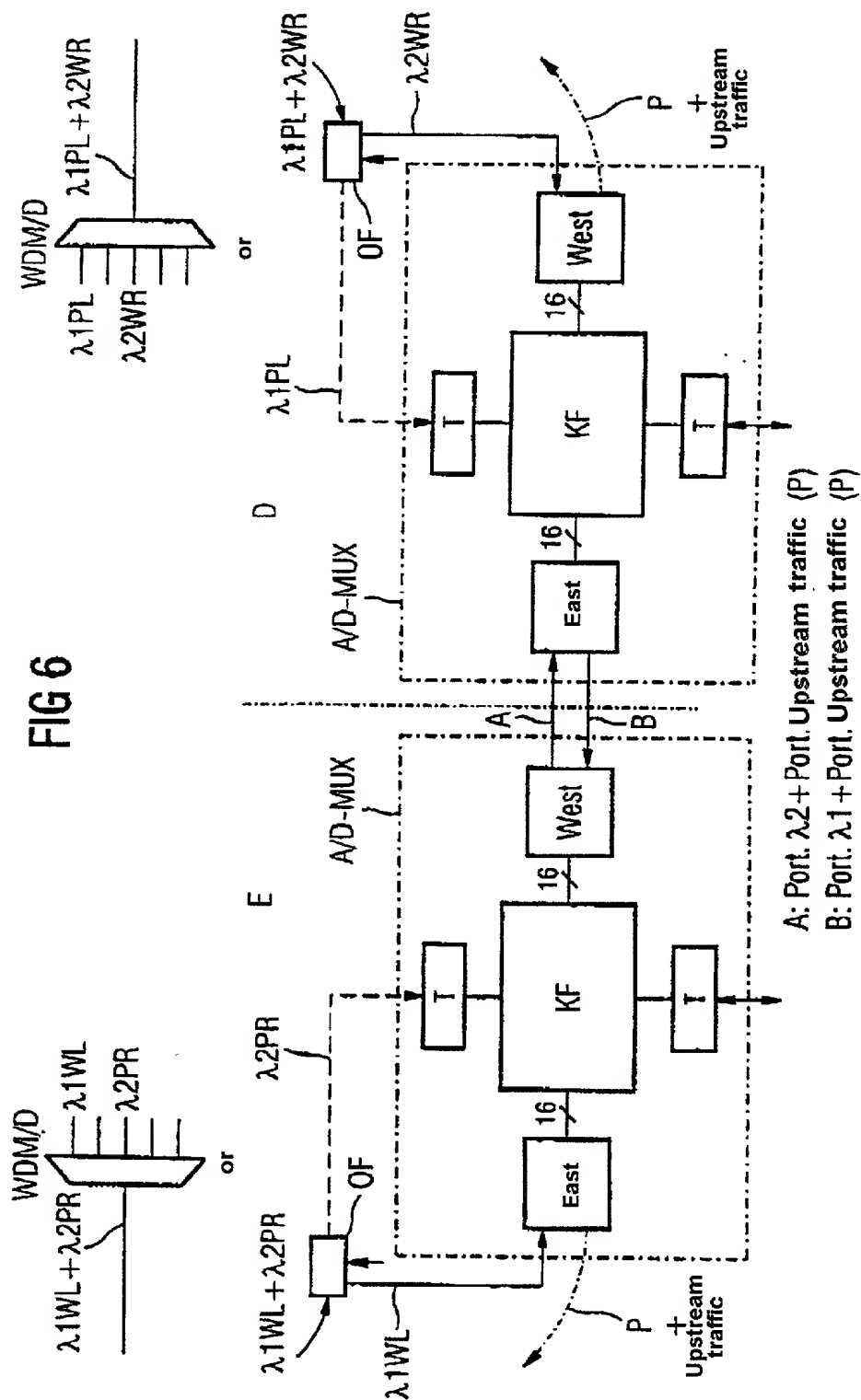
FIG 3



**FIG 4**







# Declaration and Power of Attorney For Patent Application

## Erklärung Für Patentanmeldungen Mit Vollmacht

### German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

WDM Ringnetz

deren Beschreibung

(zutreffendes ankreuzen)

☒ hier beigelegt ist.

☐ am \_\_\_\_\_ als

PCT internationale Anmeldung

PCT Anmeldeungsnummer \_\_\_\_\_

eingereicht wurde und am \_\_\_\_\_

abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which

(check one)

☐ is attached hereto.

☐ was filed on \_\_\_\_\_ as

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PCT Application No. \_\_\_\_\_

and was amended on \_\_\_\_\_

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

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## German Language Declaration

Prior foreign applications  
Priorität beansprucht

Priority Claimed

198 39 609.0 Germany 31. August 1998  
(Number) (Country) (Day Month Year Filed)  
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☒ ☐  
Yes No  
Ja Nein

\_\_\_\_\_  
(Number) (Country) (Day Month Year Filed)  
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐  
Yes No  
Ja Nein

\_\_\_\_\_  
(Number) (Country) (Day Month Year Filed)  
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐  
Yes No  
Ja Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

\_\_\_\_\_  
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(Anmeldeseriennummer)

\_\_\_\_\_  
(Filing Date)  
(Anmeldedatum)

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(Status)  
(patentiert, anhängig,  
aufgegeben)

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(Status)  
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09/8606 "2098/6"

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

And I hereby appoint

Messrs. William E. Vaughan (Reg. No. 39,056); Robert M. Barrett (Reg. No. 30,142); Michael S. Leonard (Reg. No. 37,557); Patricia A. Kane (Reg. No. 46,446); Thomas C. Basso (Reg. No. P46,541); Robert W. Connors (Reg. No. P46,442); Troy A. Groetren (Reg. No. 46,442); Adam H. Masia (Reg. No. 35,602); Dante J. Picciano (Reg. No. 33,543); Amy J. Gast (Reg. No. 41,773); Timothy L. Harney (Reg. No. 38,174); Renato L. Smith (Reg. No. 45,117); and Alan L. Barry (Reg. No. 30,819).

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<b>MÜLLER, Horst</b>			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
<i>Horst Müller</i>	<i>12.2.2001</i>		
Wohnsitz		Residence	
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Staatsangehörigkeit		Citizenship	
<b>Bundesrepublik Deutschland</b>			
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<b>Bundesrepublik Deutschland</b>			
Voller Name des zweiten Miterfinders (falls zutreffend):		Full name of second joint inventor, if any:	
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
Wohnsitz		Residence	
Staatsangehörigkeit		Citizenship	
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(Supply similar information and signature for third and subsequent joint inventors).